

We claim:

1. A receptacle device for protection against arc faults and leakage currents

comprising:

an upper cover;

an intermediate support;

a base;

a mounting strap installed between said upper cover and said intermediate support;

an electrical circuit board installed between said intermediate support and said base;

and

a pair of column-shaped directional locks, each having a spring wrapped around an outside of said directional lock and a locking groove formed near a bottom of said directional lock, wherein

said upper cover comprises electrical output plugs, an arc fault test button, a leakage test button and a reset button, wherein said arc fault test button, said leakage test button and said reset button pass through said mounting strap, said electrical output plugs comprising phase line openings and neutral line openings;

said mounting strap comprises ground points and, at one side of said mounting strap, a ground line input screw, wherein said ground points are safety ground receptacles of said electrical output plugs,

said intermediate support comprises a pair of output conductors, wherein said output conductors comprise conductive members and stationary electrical contacts, said conductive members correspond to said phase line openings and neutral line openings of said electrical output plugs, and said stationary electrical contacts are substantially similar and are symmetrically situated,

said base comprises a symmetrically situated pair of electrical input coupling screws, pair of electrical output screws and pair of electrical output leads, wherein said base encloses said intermediate support and said electrical circuit board, said electrical output leads are coupled to said electrical output screws, and said electrical output leads comprise stationary electrical contacts,

said electrical circuit board comprises a pair of flexible input fingers, a differential transformer to detect a current leakage, an arc sampling resistor to detect an arc fault, a reset button bias member, a solenoid coil having a plunger therein, and a horizontal, electromagnetic latch, wherein said pair of flexible input fingers are coupled to said electrical input coupling screws and each of said flexible input fingers comprises a stationary electrical contact,

said flexible input fingers pass through said differential transformer,

said arc sampling resistor is linked in series with at least one of said input coupling screws,

said reset button bias member is located below said reset button and comprises mobile contact bridges as its two arms, and two central openings extending from a top of said reset button bias member, wherein said central openings house said pair of column-shaped directional locks, said directional locks are coupled to a bottom of said reset button, said horizontal, electromagnetic latch is arranged below said directional locks and near a bottom of said central openings, said latch comprises two openings corresponding to said directional locks, wherein a spring is provided between one side of said reset button bias member and said latch, and said plunger rests against a top portion of said latch,

each of said mobile contact bridges of said reset button bias member has three

triangularly spaced electrical contacts, wherein one electrical contact is coupled to the stationary electrical contact on a respective flexible input finger, wherein the other two electrical contacts are coupled to said stationary electrical contacts on a respective output conductor of said intermediate support and a respective electrical output lead of said base to control an electrical supply of said electrical output plugs on said upper cover and said electrical output leads.

2. The receptacle device according to claim 1, wherein  
 said intermediate support comprises a testing switch,  
 said reset button comprises an extension pointing downwards and a nub at a bottom end of said extension, wherein said nub is in contact with a first end of a moving arm of said testing switch and said first end of said moving arm is shaped into a curl, and

a test resistor is provided below said testing switch, wherein one end of said testing switch is coupled to components controlling a switching of a current through said solenoid coil and a second end of said testing switch is coupled to said electrical circuit board through said test resistor.

3. The receptacle device according to claim 2, wherein said leakage test button comprises an extension extending downwards and sideways, wherein said extension is in contact with a tail of said latch.

4. The receptacle device according to claim 3, wherein  
 a pair of elastic test button switch pieces are provided below said arc fault test button

and said leakage test button, wherein a test resistor is further provided below each of said test button switch pieces, first ends of said test button switch pieces are coupled to said plug phase line, and second ends of said test button switch pieces are suspended for subsequently being coupled to said test resistors,

said test resistor below said arc fault test button is coupled to a control end of an arc fault detection circuit on said electrical circuit board and said test resistor below said leakage test button is coupled to a control end of a leakage detection circuit on said electrical circuit board.

5. The receptacle device according to claim 4, wherein  
an upper portion of said directional locks has a diameter slightly larger than a diameter of a lower portion of said directional locks,  
said horizontal, electromagnetic latch latches onto said directional locks,  
said springs of said directional locks comprise lower portion springs wrapped around said lower portion of said directional locks, wherein said lower portion springs cause said reset button to spring up after said latching by said latch is released.

6. The receptacle device according to claim 5, further comprising  
a pair of compressed contact balance springs having elasticity stored therein and being provided within said reset button bias member at positions below gravity centers of said mobile contact bridges.

7. The receptacle device according to claim 6, wherein said differential transformer comprises a high frequency industrial silicon steel differential transformer and a

ferrite differential transformer of high frequency.

8. The receptacle device according to claim 7, wherein said upper cover further comprises indicator lights coupled to said electrical circuit board.

9. A receptacle device for protection against arc faults and leakage currents comprising:

an upper cover comprising electrical output plugs, an arc fault test button, a leakage test button and a reset button, said electrical output plugs comprising phase line openings and neutral line openings;

a base comprising a pair of electrical input couplings;

electrical circuit components coupled to said electrical input couplings and electrical output plugs for detecting an arc fault and a leakage current;

an electromagnetic latch, said electrical circuit components outputting a signal to said electromagnetic latch to control said electromagnetic latch,

a pair of locks coupled to said reset button, said electromagnetic latch performing at least one of latching onto and releasing said pair of locks; and

a reset button bias member located below said reset button and comprising two central openings extending from a top of said reset button bias member, wherein each of said central openings houses a respective one of said pair of locks and depressing said reset button causes said electromagnetic latch to latch onto said pair of locks and electrically couple said electrical input couplings to said electrical output plugs.

10. The receptacle device according to claim 9, wherein said leakage test button

comprises an extension extending downwards and sideways, wherein said extension is in contact with a tail of said electromagnetic latch.

11. The receptacle device according to claim 10, wherein depressing said leakage test button controls said electromagnetic latch to release said pair of locks and electrically decouple said electrical input couplings from said electrical output plugs.

12. The receptacle device according to claim 9, wherein said electrical circuit components control said electromagnetic latch to release said pair of locks when said electrical circuit components detect at least one of said arc fault and said leakage current.

13. The receptacle device according to claim 9, wherein said pair of locks are column-shaped directional locks.

14. The receptacle device according to claim 9, wherein each of said pair of locks comprises a spring wrapped around its outside surface.

15. The receptacle device according to claim 9, wherein said electromagnetic latch has two openings, each opening engaging a groove formed on a respective one of said pair of locks.

16. A receptacle device for protection against arc faults and leakage currents comprising:

an upper cover comprising electrical output plugs, an arc fault test button, a leakage

test button and a reset button, the electrical output plugs comprising phase line openings and neutral line openings;

a base comprising a pair of electrical input couplings and a pair of electrical output couplings;

electrical circuit components coupled to said input couplings and electrical output plugs for detecting an arc fault and a leakage current,

a pair of mobile contact bridges, each mobile contact bridge having three electrical contacts, wherein a first one of said three electrical contacts is electrically coupled to a respective one of said electrical input couplings, a second one of said three electrical contacts is electrically coupled to a respective one of said electrical output plugs, and a third one of said three electrical contacts is electrically coupled to a respective one of said output couplings, and

a moving device coupled to said reset button for causing said pair of mobile contact bridges to perform at least one of coupling said electrical contacts of said pair of mobile contact bridges to said electrical input couplings, said electrical output plugs and said electrical output couplings and decoupling said electrical contacts of said pair of mobile contact bridges from said input couplings, said electrical output plugs and said electrical output couplings.

17. The receptacle device according to claim 16, wherein said electrical contacts of said pair of mobile contact bridges are decoupled from said electrical input couplings, said electrical output plugs and said electrical output couplings when said electrical circuit components detect at least one of said arc fault and said leakage current.

18. The receptacle device according to claim 16, wherein said coupling of said electrical contacts of said pair of mobile contact bridges to said input couplings, said electrical output plugs and said electrical output couplings supplies an electrical supply to said electrical output plugs on said upper cover and said electrical output leads.

19. The receptacle device according to claim 16, wherein said three electrical contacts of each mobile contact bridge are triangularly spaced.

20. The receptacle device according to claim 19, wherein each of said mobile contact bridges has a couple of contact balance springs placed underneath.